

B.9 SOUR GAS TRUNK LINE MITIGATION MEASURES

One measure available to mitigate H₂S impacts from trunk line ruptures would be the use of block valves to seal off a segment of ruptured pipeline. Block valves react to changes in pipeline pressure and close in a period ranging from a few seconds to a few minutes, depending on pipeline diameter. A quantitative risk assessment was conducted using the trunk line block valve spacings as specified by the applicants, as well as additional block valve spacing along trunk line segments near populated areas. The results are presented below.

PROPOSED ACTION WITH ADDITIONAL BLOCK VALVES

For the Proposed Action, the Quasar trunk line was modeled with 10-mile block valve spacing (as proposed) away from the designated populated areas. In addition, 2-mile block valve spacing near population areas was investigated to explore possible mitigation measures. Northwest's trunk line was modeled, as proposed, with 5-mile block valve spacing away from the population areas, and 2.5-mile block valve spacing near the population areas. In addition, 1-mile block valve spacing near populated areas was investigated to explore possible mitigation measures. Northwest's trunk line was modeled with shorter block valve spacings because the gas has a higher average H₂S content than is expected to occur in Quasar's gas field.

The modeling analysis was carried out as described in the Health & Safety Technical Report, and a corresponding risk assessment was performed for the Proposed Action with mitigation by additional block valves. The population areas considered were LaBarge, Big Piney/Marbleton, Calpet, and the Fontenelle Recreation Area. The results are shown in Table B.9-1. It was found that only Calpet would be at risk of exposure to lethal levels from a trunk line rupture, and that the use of additional block valves reduces the annual risk of lethal exposure by about 25 percent (from 0.00023 to 0.00018). The annual risk of discomfort exposure is reduced even more, about 33 percent (from 0.00037 to 0.00025). With this additional block

TABLE B.9-1

ANNUAL RISK TO POPULATED AREAS FROM PROPOSED ACTION
WITH ADDITIONAL BLOCK VALVES

Populated Area	Individual Risk of Lethal Exposure ¹	Individual Annual Risk of Significant Impact ²	Approximate Number of People (1990) ³
LaBarge	negligible ⁴	negligible	1,206
Big Piney	negligible	negligible	1,177
Marbleton	negligible	negligible	1,134
Calpet	0.00018	0.00025	54
Fontenelle Recreation Area	negligible	negligible	1,210

¹Risk values shown in this table, such as 0.00025, mean 25 chances per 100,000.

²Significant exposures are those that would cause eye irritation, coughing, loss of smell, or other discomfort.

³Includes people in incorporated and unincorporated area.

⁴Negligible means that the modeling analysis indicates no risk.

valve spacing near the populated areas of LaBarge, Big Piney/Marbleton, and the Fontenelle Recreation Area, the annual risk of discomfort exposure declines to negligible.

BUCKHORN ALTERNATIVE WITH ADDITIONAL BLOCK VALVES

For the Buckhorn Alternative, the Quasar trunk line was modeled with 10-mile block valve spacing (as proposed) away from the designated populated areas. In addition, 2-mile block valve spacing near the population areas was investigated to explore possible mitigation measures. Northwest's trunk line was modeled with 5-mile valve spacing (as proposed) away from the population areas and 2.5-mile near populated areas. In addition, 1-mile block valve spacing near the population areas was investigated as a possible mitigation measure.

The modeling analyses were carried out and a corresponding risk assessment was performed for the Buckhorn Alternative, with mitigation by additional block valves. The results, shown in Table B.9-2, are identical to those described above for the Proposed Action with additional block valves.

SHUTE CREEK ALTERNATIVE WITH ADDITIONAL BLOCK VALVES

For the Shute Creek Alternative, the Quasar and Exxon trunk lines were modeled with 10-mile block valve spacing (as proposed) away from the designated populated areas. As before, additional 2-mile block valve spacing near the population areas was explored as a possible mitigation measure. Northwest's trunk line was modeled with 5-mile block valve spacing (as proposed) away from the population areas, 2.5-mile near populated areas, and also as before, with additional 1-mile block valve spacing near the population areas.

The modeling analyses were carried out and a corresponding risk assessment was performed for the Shute Creek Alternative with mitigation by additional block valves. The results are shown in Table B.9-3. It was found that only Calpet would be at risk of exposure to lethal levels from a trunk line rupture. The annual risk of lethal exposure at LaBarge declines to negligible. The use of additional block valves reduces the annual risk of

TABLE B.9-2

ANNUAL RISK TO POPULATED AREAS FROM BUCKHORN ALTERNATIVE
WITH ADDITIONAL BLOCK VALVES

Populated Area	Individual Risk of Lethal Exposure ¹	Individual Annual Risk of Significant Impact ²	Approximate Number of People (1990) ³
LaBarge	negligible ⁴	negligible	1,206
Big Piney	negligible	negligible	1,177
Marbleton	negligible	negligible	1,134
Calpet	0.00018	0.00025	54
Fontenelle Recreation Area	negligible	negligible	1,210

¹Risk values shown in this table, such as 0.00025, mean 25 chances per 100,000.

²Significant exposures are those that would cause eye irritation, coughing, loss of smell, or other discomfort.

³Includes people in incorporated and unincorporated area.

⁴Negligible means that the modeling analysis indicates no risk.

TABLE B.9-3

ANNUAL RISK TO POPULATED AREAS FROM SHUTE CREEK ALTERNATIVE
WITH ADDITIONAL BLOCK VALVES

Populated Area	Individual Risk of Lethal Exposure ¹	Individual Annual Risk of Significant Impact ²	Approximate Number of People (1990) ³
LaBarge	negligible ⁴	0.000068	864
Big Piney	negligible	negligible	861
Marbleton	negligible	negligible	845
Calpet	0.00037	0.00053	40
Fontenelle Recreation Area	negligible	negligible	1,210

¹Risk values shown in this table, such as 0.00053, mean 53 chances per 100,000.

²Significant exposures are those that would cause eye irritation, coughing, loss of smell, or other discomfort.

³Includes people in incorporated and unincorporated area.

⁴Negligible means that the modeling analysis indicates no risk.

lethal exposure at Calpet by about 23 percent (from 0.00048 to 0.00037). The annual risk of discomfort exposure at Calpet is reduced even more, about 45 percent (from 0.00093 to 0.00053) with this additional block valve spacing. The annual risk of discomfort exposure declines to negligible at Big Piney/Marbleton and the Fontenelle Recreation Area, and declines by about 80 percent (from 0.00033 to 0.000068) at LaBarge.

NORTHERN ALTERNATIVE WITH ADDITIONAL BLOCK VALVES

For the Northern Alternative the Quasar trunk line was modeled with 10-mile block valve spacing (as proposed) away from the designated populated areas, and as before with additional 2-mile block valve spacing near the population areas. Northwest's trunk line was modeled with 5-mile block valve spacing (as proposed) away from the population areas, 2.5-mile near populated areas, and as before, with additional 1-mile block spacing near the population areas.

The modeling analyses were carried out and a corresponding risk assessment was performed for the Northern Alternative with mitigation by additional block valves. The results are shown in Table B.9-4. It was found that, with these additional block valves, none of the population areas would be at annual risk of significant exposures.

EFFECTS OF ADDITIONAL BLOCK VALVES ON EXPOSURE DISTANCES

Table B.9-5 shows the effects of additional block valves on the downwind distances for significant H_2S exposure from trunk line ruptures. Exposure distances would depend not only on block valve spacing but also on pipeline diameter and atmospheric conditions. These parameters are summarized for all trunk lines (30 inches and larger) for each applicant and alternative.

CONCLUSION

Use of additional block valves along trunk line segments near population areas can appreciably reduce the risk of significant impacts from the Proposed or Alternative Actions:

- The small community of Calpet is expected to experience an appreciably smaller risk of lethal exposure under the Proposed

TABLE B.9-4
ANNUAL RISK TO POPULATED AREAS FROM NORTHERN ALTERNATIVE
WITH ADDITIONAL BLOCK VALVES

Populated Area	Individual Risk of Lethal Exposure	Individual Annual Risk of Significant Impact ¹	Approximate Number of People (1990) ²
LaBarge	negligible ⁴	negligible	1,212
Big Piney	negligible	negligible	1,217
Marbleton	negligible	negligible	1,171
Calpet	negligible	negligible	56
Fontenelle Recreation Area	negligible	negligible	1,210

¹Significant exposures are those that would cause eye irritation, coughing, loss of smell, or other discomfort.

²Includes people in incorporated and unincorporated area.

³Negligible means that the modeling analysis indicates no risk.

TABLE B.9-5

DOWNWIND DISTANCES FOR SIGNIFICANT H₂S EXPOSURES FROM RUPTURES OF PROPOSED TRUNK LINES

Applicant	Trunk Line Diameter (inches)	Block Valve Spacing (miles)	Downwind Distance for Lethal Dose (miles)		
			Stable Atmosphere	Neutral Atmosphere	Unstable Atmosphere
Quasar (Proposed Action) and Exxon (Shute Creek Alternative)	30	10	2.5	0.9	0.4
	30	2 ¹	1.7	0.8	0.4
Quasar (Buckhorn, Shute Creek, and Northern Alternatives)	36	10	3.5	1.2	0.6
	36	2 ¹	2.1	1.1	0.4
Northwest (All Alternatives)	30	5	2.9	1.1	0.5
	30	2.5	2.2	0.9	0.4
	30	1 ¹	1.6	0.8	0.3
			Downwind Distance for Significant Dose (miles)		
Quasar (Proposed Action) and Exxon (Shute Creek Alternative)	30	10	6.8	1.4	0.7
	30	2 ¹	2.5	1.2	0.4
Quasar (Buckhorn, Shute Creek, and Northern Alternatives)	36	10	9.9	1.9	0.8
	36	2 ¹	3.2	1.6	0.6
Northwest (All Alternatives)	30	5	5.6	1.7	0.7
	30	2.5	3.4	1.5	0.6
	30	1 ¹	2.2	1.2	0.4

¹Mitigation block valve spacing.

Action, Buckhorn Alternative, or Shute Creek Alternative. It is expected that none of the other population areas would experience an annual risk of lethal dose.

- Under either the Proposed Action, the Buckhorn Alternative, or the Shute Creek Alternative the risks of discomfort exposure at LaBarge, Big Piney/Marbleton, and the Fontenelle Recreation Area are reduced effectively to zero (except for LaBarge under the Shute Creek Alternative).
- Under the Northern Alternative, no risks of significant exposures are expected at any of the population areas.